REMARKS

35 U.S.C. §112 Rejections

35 U.S.C. §112, first paragraph

The Patent Office has rejected Claims 1-4, 8-10 and 16-20 under 35 U.S.C. §112, first paragraph.

All questions of enablement are evaluated against the claimed subject matter. The focus of the examination inquiry is whether everything within the scope of the claim is enabled. The Federal Circuit has repeatedly held that "the specification must teach those skilled in the art how to make and use the full scope of the claimed invention without 'undue experimentation'." [1] Nevertheless, not everything necessary to practice the invention needs to be disclosed. In fact, what is well-known is best omitted.[2] All that is necessary is that one skilled in the art be able to practice the claimed invention, given the level of knowledge and skill in the art. Furthermore, the scope of enablement must only bear a "reasonable correlation" to the scope of the claims.[3] With regard to the breadth of the of a claim relevant to enablement, the only relevant concern should be whether the scope of enablement provided to one skilled in the art by the specification is commensurate with the scope of protection sought by the claims.[4]

The Applicants respectfully assert that the present invention does not carry out a correction of the microscope objectives, because the objectives selected for the double confocal microscope as claimed in amended Claim 1 are pre-selected high quality, corrected objectives with regard to longitudinal aberrations. Applicants respectfully direct the Patent Office to pages 11-13 (line 9 on page 13 to line 22 on page 13) of the specification, which states that the objectives are preferably selected in such a way that the location of the focal planes are fulfilled in order to achieve the desire resolution improvement. To practice the claimed invention, the two microscope objectives need to be as identical as possible (of course, even high quality objectives are rarely completely identical due to manufacturing tolerances). Applicants assert that selection of objectives with the desired focal planes is a normal function of building

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1 *In re Wright, 999 F.2d 1557, 1561; 27 USPQ2d 1510, 1513 (Fed. Cir. 1993).*
2 *In re Buchner, 929 F.2d 660, 661; 18 USPQ2d 1331, 1332 (Fed. Cir. 1991).*
3 *In re Fisher, 427 F.2d 833, 839; 166 USPQ2d 18, 24 (CCPA 1970).*
4 *In re Moore, 439 F.2d 1232, 1236; 169 USPQ 236, 239 (CCPA 1971) (See MPEP 2164.08).*

microscopes and can not qualify as "undue experimentation". Therefore, contrary to the Patent Office's assertion, it is argued that the specification teaches those of ordinary skill in the art how to make and use the full scope of the claimed invention without "undue experimentation". It is requested that the Patent Office withdraw its rejection of independent Claim 1 and its dependent claims 2-4, 8-10 and 16-20.

35 U.S.C. §112, second paragraph

The Patent Office has rejected Claims 1-4, 8-10 and 16-20 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite.

Applicants respectfully assert that Claim 1 has been amended and is now in condition for allowance. "The order of magnitude" language in Claim 1 is a well-known mathematical term. Two quantities of the same kind which differ by less than a factor of 10 are said to be of the same order of magnitude. The term is widely used in scientific and engineering calculations. So a resolution of a microscope which does not differ from the theoretical resolution by more than a factor of 10 will be within the order of magnitude of the theoretical resolution. Line 25 on page 2 of the specification as originally filed gives an example of the theoretical achievable resolution of 100 nm. A resolution within the order of magnitude of 100 nm would be a resolution between 100 nm and 1000 nm. "Theoretically achievable resolution" is a known characteristic of a microscope, it is known to a person of ordinary skill in the art how to calculate it for a given design of a microscope with given optical components. For example, attached is a copy of the book "Light Microscopy" (pages 19-20) with a brief description of what a resolving power of a microscope is and a simple theoretical calculation. Therefore, the rejection of Claim 1 should be withdrawn.

Regarding Claim 4, the Patent Office asserts that it is allegedly unclear "how a beam-splitter of an interferometer for splitting an incident light beam into two individual beam paths can make the so-called 'accumulated aberrations of the interferometer' opposite one another." Applicants respectfully disagree.

Applicant's respectfully direct the Patent Office to Figure 1 and page 11, line 6 to page 12, line 32 of Applicant's disclosure and assert that it should be clear to one of ordinary skill in the art that when the illuminating beam path 2 is split into two individual beam paths 21 and 22

by beam splitter 10, the total aberrations of illuminating beam path 2 are also divided into two 'partial' beam path aberrations for individual beam paths 21 and 22. As can be seen from Figure 1, individual beam path 21 focuses on focal plane 19 from one direction and individual beam path 22 focuses on focal plane 19 from the opposite direction. This causes the two "partial" beam path aberrations for individual beam paths 21 and 22, which is equal the total, or accumulated, aberrations of the interferometer, to be opposite one another. Thus, Applicants respectfully assert that amended Claim 4 is not indefinite. Applicants respectfully request that the Patent Office withdraw its rejection of Applicants amended Claims 1 and 4 and Claims 2-3, 8-10 and 16-20.

35 U.S.C. §102 Rejections

35 U.S.C. §102(b)

The Patent Office has rejected Claims 1-3, 8-9 and 20 under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent 4,965,441 to Picard ("Picard"). Applicants respectfully disagree.

It is well established that a claim is anticipated under 35 U.S.C. §102, only if each and every element of the claim is found in a single prior art reference.[5] Moreover, to anticipate a claim under 35 U.S.C. §102, a single source must contain each and every element of the claim "arranged as in the claim."[6,7] Missing elements may not be supplied by the knowledge of one skilled in the art or the disclosure of another reference.[8] If each and every element of a claim is not found in a single reference, there can be no anticipation.

Applicant respectfully asserts that Picard does not disclose each and every element of amended Claim 1, including two microscope objectives disposed in opposite symmetric manner relative to a specimen. Therefore, Picard does not anticipate amended Claim 1, allowance of which is respectfully requested. Claims 2-3, 8-9 and 20 depend off Claim 1 and are allowable.

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5 *Veregal Bros. v Union Oil Co. of California, 814 F.2d 628, 631, 2USPQ2d 1051, 1053 (Fed. Cir. 1987).*
6 *Structural Rubber Prods. Co. v. Park Rubber Co., 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1271 (Fed. Cir. 1984).*
7 *Lewmar Marine Inc. v. Barient, Inc., 827 F.2d 744, 747, 3 U.S.P.Q. 2d 1766, 1768 (Fed. Cir. 1987), cert. denied, 484 U.S. 1007 (1988).*
8 *Titanium Metals Corp. v. Banner, 778 F.2d 775, 780, 227 U.S.P.Q. 773, 777 (Fed. Cir. 1985).*

35 U.S.C. §103(a)

The Patent Office rejected Claims 1-3, 8-9 and 19-20 under 35 U.S.C. §102(b) or, in the alternative, under 35 U.S.C. §103(a), over European Patent 491 289 to Hell ("Hell") in view of Picard. Moreover, the Patent Office rejected Claims 1-4, 8-9 and 19-20 under 35 U.S.C. §102(b) or, in the alternative, under 35 U.S.C. §103(a), over Danish Patent (DE) 39 18 412 to Schoppe ("Schoppe") in view of Picard.

In order for an obviousness rejection to be proper, the Patent Office must meet the burden of establishing a prima facie case of obviousness. The Patent Office must meet the burden of establishing that all elements of the invention are disclosed in the cited publications, which must have a suggestion, teaching or motivation for one of ordinary skill in the art to modify a reference or combined references.[9] The cited publications should explicitly provide a reasonable expectation of success, determined from the position of one of ordinary skill in the art at the time the invention was made.[10]

Picard does not teach or suggests or mentions two corrected microscope objectives arranged opposite of each other relative to a specimen, so that the longitudinal chromatic aberrations of the two microscope objectives with respect to the optical axis are almost identical for the two microscope objectives, as claimed in amended Claim 1. Similarly, neither Picard, nor Hell, nor Schoppe contain any suggestion, teaching or motivation for one of ordinary skill in the art to modify or combine these publications to come up with two microscope objectives arranged opposite of each other relative to a specimen, so that the longitudinal chromatic aberrations of the two microscope objectives with respect to the optical axis are almost identical for the two microscope objectives, as claimed in Applicant's amended Claim 1. Moreover, a person skilled in the art would not consider Picard's patent in designing a double confocal microscope. Picard does not teach an objective corrected with respect to chromatic aberrations. Picard merely teaches to focus polychromatic light onto different planes in order to obtain depth information from the sample. Therefore, the rejection should be withdrawn and amended Claim 1 and its dependent Claims 2-4, 8-9 and 19-20 should be allowed.

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9 *In re Sang Su Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002).*

10 *In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); Amgen v. Chugai Pharmaceuticals Co., 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996);*

Applicant also submits a substitute specification in compliance with 37 CFR 1.125(b). Care has been exercised not to introduce new matter.

Respectfully submitted,

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Ernst Leitz I took over the Optical Institute established by Carl Kellner in 1869 and expanded it further, exercising the courage to rationalize manufacturing methods and to utilize the advantages of series production. The improvement and consistently high quality of the instruments provided research scientists with a reliable, coincidence-proof means of observation.

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Contents

Microscopy – a technology with a past and a future 4

The discovery of the microcosm 4
Development of the scientific rudiments 4
The microscope as a research instrument 6
Modern applications of the microscope 7

Microscope design 10

The job of a microscope 10
Basic design: main optical components 10

The optical system 15

Basic terminology and features 15
Illumination 20
Objectives 24
Eyepieces and tube optics 29

Optical contrasting techniques 32

The specimen 32
Bright field – dark field 33
Phase contrast 35
Polarization contrast 37
Interference contrast 38
Fluorescence contrast 42
Optical contrasting techniques at a glance 45

Types of microscope and components 48

Upright microscopes 48
Inverted microscopes 48
Stereomicroscopes 52

Documentation 54

Photography 54
Video technology 57

Measurements under the microscope 59

Length, depth, structure 59
Photometry 60
Image analysis 62
Scanning microscopy 64

Microscopes in the electronic age 67

Automation for use in microelectronics 67
PC-aided microscopy 69

Outlook 70

The company behind this book 71

Resolving power

Every self-luminous point-shaped object is imaged by the objective as an Airy disc. The intensity distribution (Bessel function, 1st order) is shown in Figure 13a.

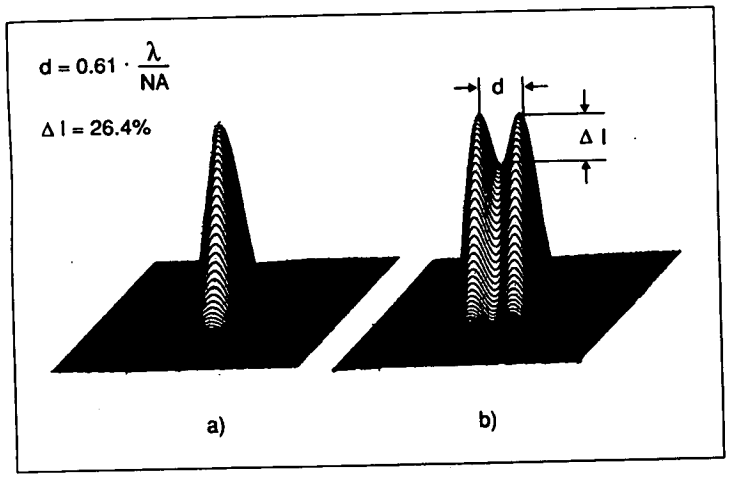

Fig. 13:
a) Airy intensity distribution in the diffraction pattern of a self-luminous point
b) Limit of resolving power for two self-luminous points (after Lord Rayleigh)

If you look at two narrowly spaced points of light of the same intensity, you will see two diffraction images whose intensities are added together where the diffraction images overlap. The images of these two points are perceived as "resolved" if the intensity between the two maxima has sunk by at least 20% (Rayleigh criterion). This is the case when the central maximum of one of the diffraction images falls directly on the first intensity minimum of the second (Fig. 13b). The smallest distance between two incoherently radiating points that can be resolved by a microscope is expressed in the formula

$$d = 0.61 \cdot \frac{\lambda}{NA}$$

Values can be higher or lower than the ones calculated with this formula, dependent on the degree of coherence of the illumination and the sensitivity of the receiver.

Useful magnification

Optimization of contrast or resolution

The smallest distance resolvable by the microscope, calculated with the above formula for a certain wavelength and objective aperture, has to be magnified sufficiently for it to be processed by receivers, primarily the human eye. If the secondary magnification is too low, the contrast in the image will be good, but the information offered by the objective cannot be fully utilized. On the other hand, if the secondary magnification is too high, the image will be blurred and contrast will not be satisfactory. There is then no additional information to be gained, as the aperture of the objective limits the resolving power. The "useful" magnification of the microscope is between 500 · *NA* and 1,000 · *NA* (*NA* = numerical aperture of the objective). Using an immersion objective with 100× magnification and a numerical aperture of 1.30, eyepiece magnifications in a range of 6.3× to 12.5× can therefore be used to good effect.

Illumination

Light sources

Standard: 20 to 100 W halogen lamps

Different light sources are used in microscopy to suit the application, the standard being incandescent halogen lamps of 20 to 100 W. Special requirements of intensity or spectral range are met by mercury or xenon discharge lamps of various wattages which can